A Modified Kilroy Spring for Eruption of Palatally Impacted Canines

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The Kilroy I Spring,* introduced in 2003, is a versatile auxiliary that delivers slow and continuous force for eruption of palatally impacted canines without the need for patient compliance. It is cost effective, since it requires only stainless steel wire, and it permits simple alterations to be made for additional tooth movements.

This article describes a modified Kilroy I Spring that can be applied without removal of the deciduous canine, thus improving the patient’s esthetic appearance and helping to maintain the canine space.

Fabrication and Activation

The Kilroy Spring is fabricated from a length of .016” stainless steel wire. Four helices are bent in the same plane to engage the main archwire, and a central vertical loop ending in a helix is extended perpendicularly (Fig. 1). The base width of the vertical loop is determined by the width of the deciduous canine; where the loop clears the deciduous

Fig. 1 Modified Kilroy I Spring for eruption of palatally impacted canines.

Fig. 2 18-year-old female patient with bilateral impacted upper permanent canines and retained upper deciduous canines before treatment.
uous canine in the palatal direction, two 90° bends are placed to reduce the width by about 2mm.

In its passive state, the vertical loop lies perpendicular to the occlusal plane. The spring is activated by tightly tying the vertical arm to a bonded attachment with ligature wire.

Case Report

An 18-year-old female was referred by her general dentist for treatment of bilateral impacted maxillary permanent canines as part of comprehensive orthodontic therapy (Fig. 2). Clinical examination showed bulges in the rugae on both sides. Both maxillary deciduous canines were present and carious.

Leveling and alignment progressed to .019" × .025" stainless steel wires in both arches without extraction or bracketing of the upper deciduous canines. Nickel titanium open-coil springs were placed in the upper-canine regions to create adequate space for the permanent canines and to close the anterior spacing. The palatally impacted canines were surgically exposed, and chain attachments were bonded. Modified Kilroy Springs were threaded onto the archwire and activated (Fig. 3).

After six months of treatment, the canines had erupted to the occlusal level (Fig. 4A,B). Both Kilroy Springs were then removed, and the deciduous canines were extracted. The permanent canines were bonded, and an .016" copper nickel titanium wire was placed in the upper arch (Fig. 4B). Glass ionomer cement bite blocks on the lower molars opened the anterior bite for unobstructed labial movement of the upper canines. During further alignment and labial root torquing, the

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Fig. 3 A. Installation of modified Kilroy Springs after surgical exposure of impacted canines. B. Activation of Kilroy Springs.
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remaining spaces were consolidated with elastomeric chain (Fig. 4C).

One month before debonding, gingivectomies of the maxillary permanent canines were performed. After 18 months of treatment, the brackets were removed (Fig. 5), and fixed retainers were bonded in both arches.

Discussion

In a non-growing patient, eruption of an impacted tooth into the arch generally involves space gaining followed by surgical exposure and orthodontic traction. Space for a permanent canine is usually maintained either by continuously tying the teeth mesial and distal to the tooth or by placing an open-coil spring on the archwire. If the canine is palatally impacted, an initial vertical force is usually needed to move the tooth away from the adjacent roots. An archwire of sufficient stiffness, such as .018” × .022”, is required to resist deformation by the 50-60g of force exerted during traction.2,3 Because of side effects on the neighboring teeth, however, we find that continuous ties or open-coil springs are not absolutely reliable as space maintainers. We therefore recommend that the deciduous canines be kept in place during orthodontic traction. Adult patients are happy to keep their deciduous teeth as long as possible for esthetic reasons.

REFERENCES